

TM 11-6625-544-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL
MAINTENANCE MANUAL

POWER SUPPLY PP-3690/GPM

*For General Microwave 303
Klystron Power Supply*

- No Schematic



HEADQUARTERS, DEPARTMENT OF THE ARMY

28 DECEMBER 1962

WARNING

Be careful when working on the 110-220-volt connections and the beam and reflector output connections and on the EXT. MOD jack. Voltages up to -1,200 volts are present. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

RADIATION HAZARD



CO 60 N₁63

Tube types OB2 and 5841 (voltage regulators) used in the power supply contains radioactive material. These tubes are potentially hazardous when broken; see qualified medical personnel and the Safety Director if you are exposed to or cut by broken tubes. Be extremely careful when replacing these tubes and follow safe procedures in their handling, storage, and disposal.

Never place radioactive tubes in your pocket.

Be careful not to break radioactive tubes while handling them.

Never remove radioactive tubes from cartons until ready to use them.

Technical Manual
No. 11-6625-544-12

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., 28 December 1962

POWER SUPPLY PP-3690/GPM

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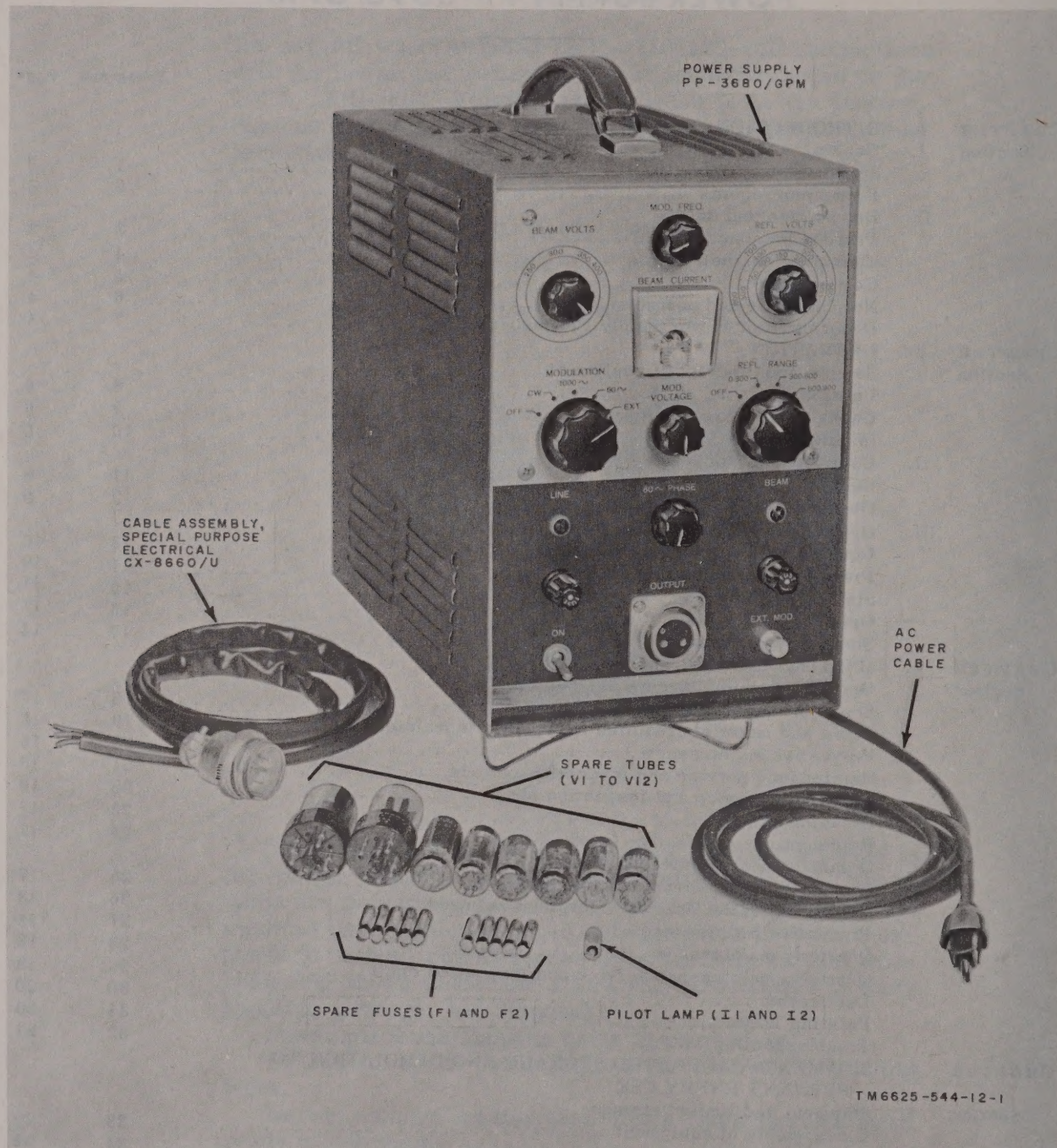


Figure 1. Power Supply PP-3690/GPM, less technical manuals.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

This manual describes Power Supply PP-3690/GPM and covers its operation and the operator's and organizational maintenance. It includes operation under usual conditions, cleaning and inspection of the equipment, and replacement of parts available to first and second echelons.

2. Forms and Records

a. Report of Unsatisfactory Equipment. Fill out DA Form 2407 (Maintenance Request) in accordance with instructions in TM 38-750 and forward it to: Commanding Officer, U. S. Army Electronics Materiel Support Agency, ATTN: SELMS-PIE, Fort Monmouth, N. J. The form should be filled out and forwarded to report:

- (1) Receipt of defective equipment (use DD Form 6 (*b* below) if defect is due to damaged or improper shipment).
- (2) Equipment deficiencies (deadlined equipments).
- (3) Equipment shortcomings (operable but at less than rated capability or efficiency).
- (4) Equipment improvement suggestions and recommendations.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378, and AFR 71-4 (Air Force).

c. Comments on Manual. Forward all other comments on this publication direct to: Commanding Officer, U. S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, New Jersey. (DA Form 1598 (Record of Comments on Publications), DA Form 2496 (Disposition Form), or letter may be used.)

d. Index of Equipment Publications. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. Department of the Army Pamphlet No. 310-4 is a current index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders that are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc) and the latest changes and revisions of each equipment publication.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Power Supply PP-3690/GPM (fig. 1) is an alternating-current (ac) operated, portable klystron power supply that is used to provide various operating voltages for low-power klystron and reflex klystron tubes. Two separate regulated voltage ranges are provided:

- (1) A continuously variable beam voltage (negative relative to ground), from -250 volts to -400 volts, with

current drain from 30 to 50 milliamperes (ma).

- (2) A continuously variable reflector voltage (negative relative to the beam voltage), from 0 to -900 volts, with current drain of 10 microamperes (ua).
- (3) A 6.3-volt ac filament supply with a maximum current drain of 1.5 amperes.

b. These voltages are applied to the

beam and reflector terminals of the klystron tube. In addition, provision is made for either adjustable internal modulation or external modulation on the reflector voltage. Power Supply PP-3690/GPM can be operated from either a 115-volt or a 230-volt ac power source, and is equipped with a three-conductor power cable.

c. To minimize the chance of accidental damage to a klystron tube, Power Supply PP-3690/GPM contains a protective circuit that prevents the reflector of the klystron tube from becoming more positive than the cathode.

4. Technical Characteristics

Dc output Beam voltage, variable from -250 to -400 volts; maximum current is 30 ma at -250 volts, and 50 ma at -400 volts.

Reflector voltage, variable from 0 to -900 volts relative to the beam voltage; maximum current is 10 ua at -900 volts.

Ac output 6.3 volts $\pm 10\%$; maximum current is 1.5 amperes.

Internal modulation 1,000 cps ± 100 square wave on the reflector voltage, with the amplitude variable from 0 to 110 volts peak to peak.

Sinusoidal powerline frequency, variable from 0 to 350 volts peak to peak for reflector modulation.

External modulation Front-panel terminal provided, input impedance of 100,000 ohms.

Regulation Within 1% for both beam and reflector supplies.

Ripple Less than 7 mv for the beam supply.

Less than 10 mv for the reflector supply.

Line-voltage input 115-230 volts, 50-60 cps.

Power consumption 200 watts.

Number of tubes. 13.

Weight 22 pounds.

5. Components

The components and the running spares of Power Supply PP-3690/GPM are listed in appendix III and are illustrated in figure 1.

6. Nomenclature and Common Names

The nomenclature and common names of the components of Power Supply PP-3690/GPM are given below.

Nomenclature	Common name
Power Supply PP-3680/GPM (p/o Power Supply PP-3690/GPM)	Power supply
Cable Assembly, Special Purpose, Electrical CX-8660/U	Output cable

7. Description of Power Supply PP-3690/GPM

a. *Power Supply PP-3680/GPM.* Power Supply PP-3680/GPM (the main component part of Power Supply PP-3690/GPM) is a portable 13-tube, ac-operated power supply that is used to supply operating voltages for low-power klystrons. It is enclosed in a ventilated metal housing, which is equipped with a carrying handle. All operator's controls are front-panel mounted, with the output obtained by means of a front-panel five-pin output connector. The output cable is supplied for this purpose.

b. *Cable Assembly, Special Purpose, Electrical CX-8660/U.* The output cable is fitted with a five-pin male connector on one end. This mates with the front-panel-mounted five-pin female connector. The other end of the cable connects to the klystron tube as follows:

- (1) The red lead connects to the klystron tube cathode terminal.

CHAPTER 2

OPERATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

8. Unpacking (fig. 2)

a. *Packaging Data.* When packed for shipment, the components of Power Supply PP-3690/GPM are packed in two cardboard cartons and a wooden box. A typical shipping box and its contents are shown in figure 2. The dimensions of the shipping box are 23 by 11 by 15 inches, the volume is 2.2 cubic feet, and the weight is 27 pounds.

b. *Removing Contents* (fig. 2).

- (1) Cut and fold back the metal straps.
- (2) Remove the nails from the top of the box with a nailpuller.
- (3) Remove the moisture-vaporproof

bag containing the manuals, the carton containing the running spares, and the remaining waterproof bag containing the power supply.

- (4) Remove the carton containing the power supply from the waterproof bag, and open the carton.
- (5) Remove the second moisture-vaporproof bag containing the power supply, and then the second carton from the bag.
- (6) Open the carton and remove the equipment.

c. *Component Dimensions.*

Component	Overall dimensions (in.)			Unit weight (lb)
	Height	Depth	Width	
Power Supply PP-3680/GPM ----- Cable Assembly, Special Purpose, Electrical CX-8660/U (3 feet long)	11-1/2	13-1/10	7 1/2	22

9. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 2).

b. See that the equipment is complete, as listed on the packing slip. If a packing slip is not available, check the equipment against the basic issue items list (appx III. Report all discrepancies on DD Form 6.

Note: Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If it has been modified, the MWO number will appear on the front panel, near the nomenclature plate. Check to see whether the MWO number (if any) and the

appropriate notations concerning the modification have been entered in the equipment manual.

Note: Current MWO's applicable to the equipment are listed in DA Pamphlet 310-4.

10. Installation

a. Thoroughly inspect the exterior of the power supply for damage incurred during shipment.

b. Loosen the screws on the back of the power supply cabinet and remove the chassis from the cabinet.

c. Make certain that no vacuum tubes are broken and that they are properly seated in their correct sockets (fig. 3).

d. Inspect the internal wiring to make certain that the lugs are securely fastened to the leads and that the leads are securely fastened to the points of contact.

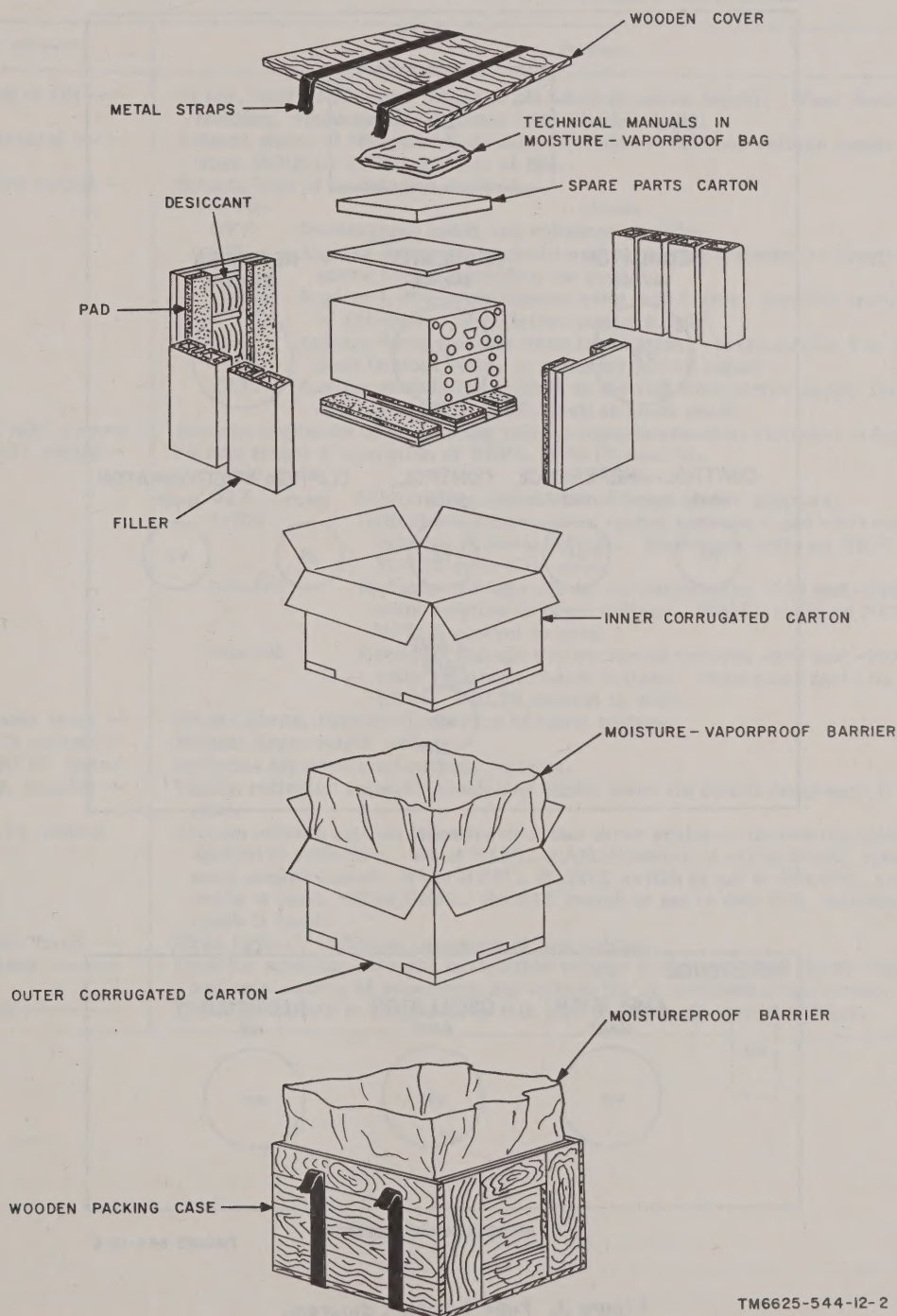
e. Inspect the power and output cables

for kinks and cracks, and make certain that the plugs are properly connected.

f. See that fuses F1 and F2 are installed and that they have the proper rating (para 24).

g. Check the wiring to determine which

voltage the power supply is connected for (115 or 230 volts). If the power supply is connected for 115-volt operation, there will be a jumper connecting the black wire to the black-green wire coming from the power transformer and another jumper



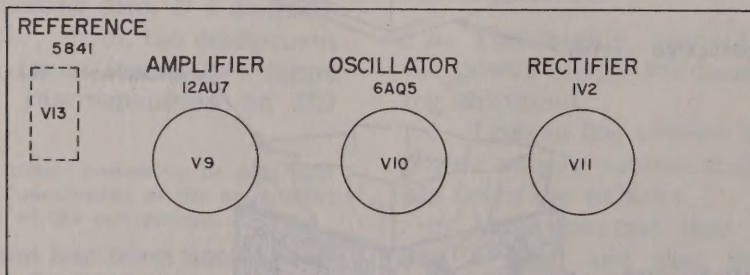
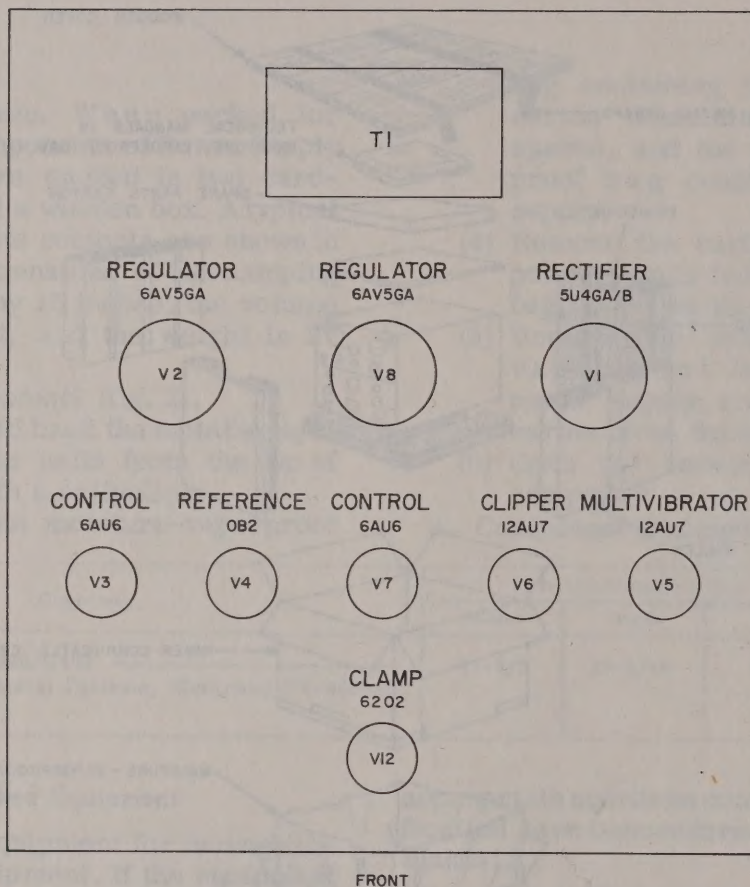
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Figure 2. Typical packaging.

connected between the black-yellow and the black-red wires coming from the power transformer. If the power supply is connected for 230-volt operation, there will be a jumper between the black-yellow and the black-green wires. Refer to higher

echelon for conversion to a voltage other than that for which the power supply is connected.

h. Replace the cabinet and tighten all screws.



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Figure 3. Tube location diagram.

Section II. CONTROLS AND INDICATORS

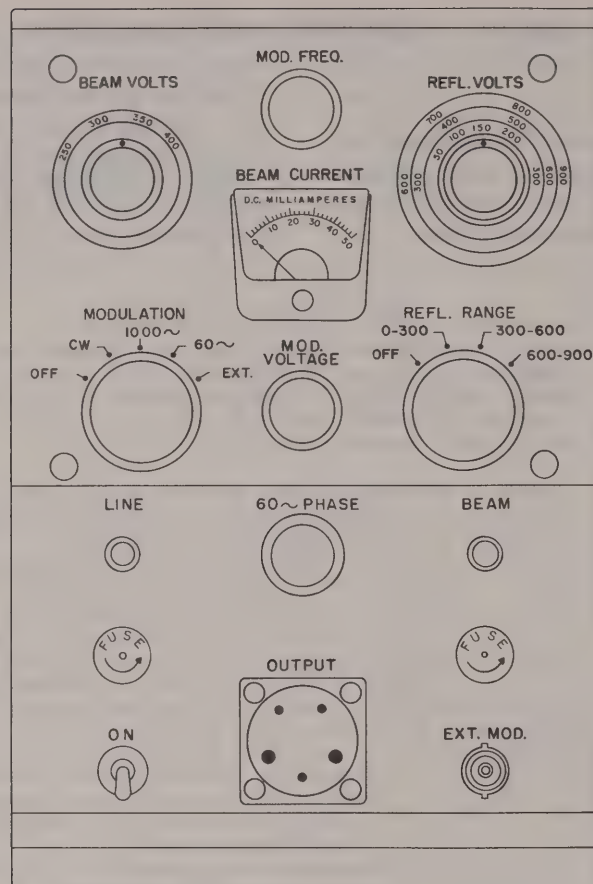
11. General

This section covers only items used by the operator; items used by maintenance personnel are covered in instructions for the appropriate maintenance echelon.

12. Operator's Controls and Indicators (fig. 4)

The following chart lists the controls and indicators of the power supply and indicates their functions:

Control or indicator	Function												
Power switch to ON----	At ON, applies filament power to all tubes in power supply. When down (off) position, disconnects all power from power supply.												
60 \sim PHASE control -----	Adjusts phase of 60-cycle modulation applied to reflector voltage supply when MODULATION switch is at 60 \sim .												
MODULATION switch --	Selects type of modulation desired.												
	<table> <tr> <th>Position</th><th>Action</th></tr> <tr> <td>OFF</td><td>Deenergizes beam and reflector supplies.</td></tr> <tr> <td>CW</td><td>Applies constant, unmodulated voltage to reflector of klystron under test to provide a cw output.</td></tr> <tr> <td>1000\sim</td><td>Applies 1,000-cycle square wave modulation, variable from 0 to 110-volts, to reflector power supply.</td></tr> <tr> <td>60\sim</td><td>Applies 60-cycle sine wave modulation, variable from 0 to 350 peak to peak volts, to reflector power supply.</td></tr> <tr> <td>EXT.</td><td>Applies modulation voltage to the reflector power supply that is applied to EXT. MOD. jack on front panel.</td></tr> </table>	Position	Action	OFF	Deenergizes beam and reflector supplies.	CW	Applies constant, unmodulated voltage to reflector of klystron under test to provide a cw output.	1000 \sim	Applies 1,000-cycle square wave modulation, variable from 0 to 110-volts, to reflector power supply.	60 \sim	Applies 60-cycle sine wave modulation, variable from 0 to 350 peak to peak volts, to reflector power supply.	EXT.	Applies modulation voltage to the reflector power supply that is applied to EXT. MOD. jack on front panel.
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EXT.	Applies modulation voltage to the reflector power supply that is applied to EXT. MOD. jack on front panel.												
MOD. VOLTAGE control	Adjusts amplitude of modulating voltage superimposed on reflector voltage.												
REFL. RANGE switch--	Selects range of operation of REFL. VOLTS control.												
	<table> <tr> <th>Position</th><th>Action</th></tr> <tr> <td>OFF</td><td>Deenergizes reflector and beam power supplies.</td></tr> <tr> <td>0-300</td><td>Reflector voltage can be varied between 0 and -300 volts relative to beam voltage. Innermost scale on REFL. VOLTS control is used.</td></tr> <tr> <td>300-600</td><td>Reflector voltage can be varied between -300 and -600 volts relative to beam voltage. Middle scale on REFL. VOLTS control is used.</td></tr> <tr> <td>600-900</td><td>Reflector voltage can be varied between -600 and -900 volts relative to beam voltage. Outermost scale on REFL. VOLTS control is used.</td></tr> </table>	Position	Action	OFF	Deenergizes reflector and beam power supplies.	0-300	Reflector voltage can be varied between 0 and -300 volts relative to beam voltage. Innermost scale on REFL. VOLTS control is used.	300-600	Reflector voltage can be varied between -300 and -600 volts relative to beam voltage. Middle scale on REFL. VOLTS control is used.	600-900	Reflector voltage can be varied between -600 and -900 volts relative to beam voltage. Outermost scale on REFL. VOLTS control is used.		
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300-600	Reflector voltage can be varied between -300 and -600 volts relative to beam voltage. Middle scale on REFL. VOLTS control is used.												
600-900	Reflector voltage can be varied between -600 and -900 volts relative to beam voltage. Outermost scale on REFL. VOLTS control is used.												
BEAM indicator lamp --	When lighted, indicates presence of beam voltage.												
BEAM VOLTS control --	Adjusts beam output voltage.												
BEAM CURRENT meter	Indicates klystron tube cathode current.												
MOD. FREQ. control --	Varies reflector voltage-modulating signal about its center frequency (1,000 cps).												
REFL. VOLTS control	Adjusts voltage applied to reflector. Has three scales to determine voltage applied to reflector. When REFL. RANGE switch is set to 0-300, innermost scale is used. When REFL. RANGE switch is set to 300-600, center scale is used. When REFL. RANGE switch is set to 600-900, outermost scale is used.												
LINE indicator lamp ---	When lighted, indicates presence of line voltage.												
EXT. MOD jack -----	Used for applying external modulation voltage to the reflector power supply and as a source of synchronizing voltage for an external oscilloscope.												
OUTPUT jack -----	The output cable is connected at this jack to obtain the output voltage.												



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Figure 4. Power Supply PP-3680/GPM, controls and indicators.

Section III. OPERATION UNDER USUAL CONDITIONS

13. General Operating Instructions

The following procedures must be performed whenever the power supply is used:

- Preliminary starting procedure (para 14).
- Starting procedure (para 15).
- Operating procedures (para 16).
- Stopping procedure (para 17).

14. Preliminary Starting Procedure (fig. 5)

Warning: Make all connections to the klystron tube before applying the reflector and beam power. Dangerous voltages exist at the output cable terminals.

- With the output cable disconnected

from the power supply, connect the red lead of the cable to the appropriate beam voltage terminal (cathode) of the klystron tube.

- Connect the brown and white leads of the cable to the appropriate filament terminals of the klystron tube.

- Connect the black lead of the cable to the appropriate anode terminal of the klystron tube.

- Connect the remaining lead (the center lead of the shielded conductor) to the appropriate reflector terminal of the klystron tube.

- Set the MODULATION switch to OFF.

- Set the REFL. RANGE switch to OFF.

- Place the power switch to the down switch position (off).

h. Connect the output cable to the front-panel OUTPUT connector.

Caution: Check to see if the equipment is wired for the proper line voltage before

connecting it to the power source (para 10).

i. Connect the ac power cable to an ac power source.

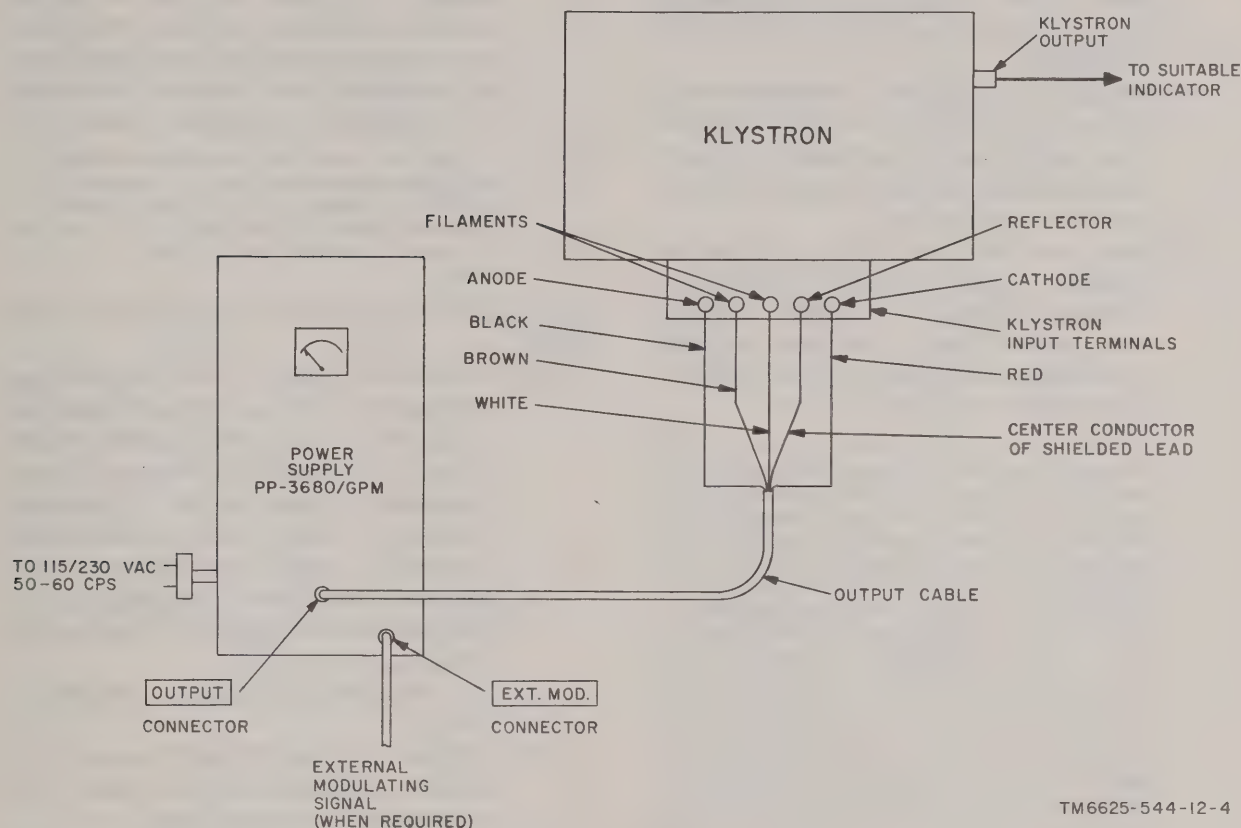


Figure 5. Typical test setup.

15. Starting Procedure

Note: Each application of the power supply for different klystron tubes is similar in principle and application. The details of each application, however, are necessarily different, and individual considerations must be given to each klystron tube. In general, the operating voltages and type of output indicator used will vary. Refer to the applicable klystron technical manual or manufacturers data to determine the required information.

a. Perform the preliminary starting procedure (para 14).

b. Set the power switch to the ON position and allow a 10-minute warmup period. The LINE indicator lamp should go on.

Caution: Always apply reflector voltage to a klystron tube before applying beam voltage.

c. Set the REFL. RANGE switch to the

desired voltage range and adjust the REFL. VOLTS control as required.

d. Set the MODULATION switch to CW. The BEAM indicator lamp should go on. Adjust the BEAM VOLTS control as required.

16. Operating Procedures

a. Obtaining 1,000-Cycle Square Wave Modulation.

- (1) With the klystron tube output connected to a suitable power indicator, perform the procedures described in paragraphs 14 and 15.
- (2) Rotate the MOD. VOLTAGE control fully counterclockwise.
- (3) Adjust the BEAM VOLTS control

until the BEAM CURRENT meter indicates the proper cathode current for the klystron tube used.

- (4) Adjust the REFL. VOLTS control until the power indicator used indicates the maximum continuous wave (cw) output in the desired mode (curve A, fig. 6). Note this reading.
- (5) Replace the power indicator with a suitable detector-tuned amplifier-indicator combination (such as a crystal detector and a standing wave indicator).
- (6) Set the MODULATION switch to 1000 μ . Adjust the MOD VOLTAGE control slightly clockwise. Adjust the MOD FREQ. control for the maximum indication on the power indicator (curve B, fig. 6).

Note: The curves shown in figure 6 illustrate the modes of operation for a typical klystron and the relationship of the amplitude of the 1,000 cycle square wave modulation to the klystron output. If it is desired to view the output signal it is necessary to connect the output to an oscilloscope through a crystal detector. If it is desired to synchronize the oscilloscope with the modulation signal, a synch signal is available at the EXT. MOD. jack on the front panel of the power supply (para 16c(3)). In some instances, the klystron modes may not be as clearly defined as those in figure 6, or trouble may be encountered in obtaining the indication because of exciting undesired modes. It is necessary in these instances to refer to the literature for the type of klystron being used to determine the proper modulation amplitude and reflector voltage.

- (7) Rotate the REFL. VOLTS control slightly counterclockwise and adjust the MOD. VOLTAGE control for slightly less than maximum output indication (curve B or C, fig. 6).
- (8) Remove the detector-tuned amplifier-indicator, and connect the power indicator. Adjust the REFL. VOLTS control for the maximum klystron tube output (curve D, fig. 6).
- (9) Rotate the REFL. VOLTS control slightly counterclockwise and adjust the MOD. VOLTAGE control for the maximum modulated output indication (curve E, fig. 6).

- (10) Alternately rotate the MOD. VOLTAGE control slightly clockwise and adjust the REFL. VOLTS control until the reading noted in (4) above is obtained. This setting insures sufficient modulation to stop klystron oscillation at the lowest reflector voltage. This setting also minimizes the possibility of exciting other modes, as shown in F, figure 6. Avoid this indication.

Note: If it is not possible to obtain a sufficient modulated output because of insufficient modulation voltage, choose a different mode of operation of the klystron or supply greater modulation voltage (c below).

b. Obtaining 60-Cycle Sine Wave Modulation.

- (1) With the klystron tube output connected to a suitable oscilloscope, perform the procedures described in a(1) through (4) above. Use a suitable crystal diode to connect to the vertical input of the oscilloscope. Apply an external 60-cycle-per-second (cps) source to the horizontal input of the oscilloscope.
- (2) Set the MODULATION switch to 60 μ .
- (3) Adjust the 60 μ PHASE control until the oscilloscope trace approaches a straight line.
- (4) Adjust the MOD. VOLTAGE control for the desired amplitude.

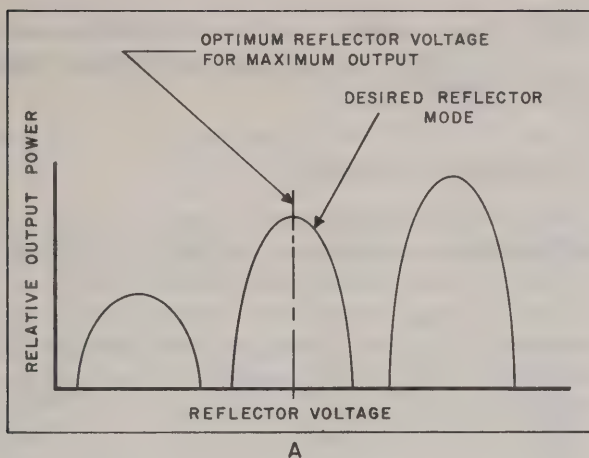
c. Using External Modulation Jack.

Warning: Dangerous voltages may be present when the EXT. MOD. jack is being used. Read the following procedures carefully and observe all precautions.

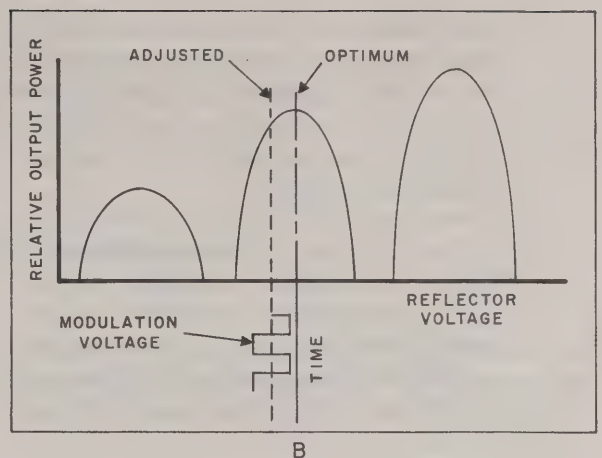
- (1) Perform the procedures described in a(1) through (4) above.

Warning: Be careful when connecting and disconnecting the cable attached to the EXT. MOD. jack. Voltages as high as -1,200 volts are present.

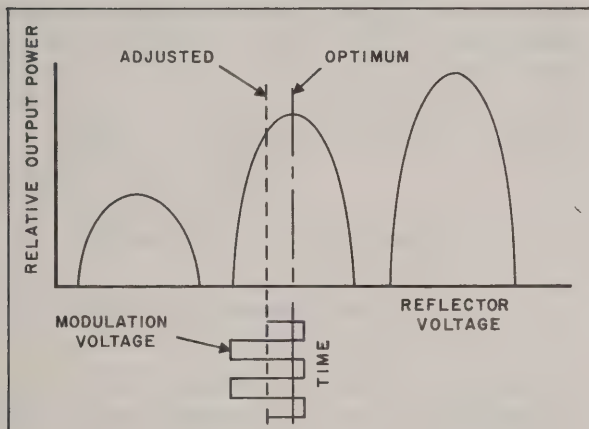
- (2) Set the MODULATION switch to EXT. Any suitable signal source can now be used to modulate the reflector voltage by means of the EXT. MOD. jack. It is important to note that a high direct-current



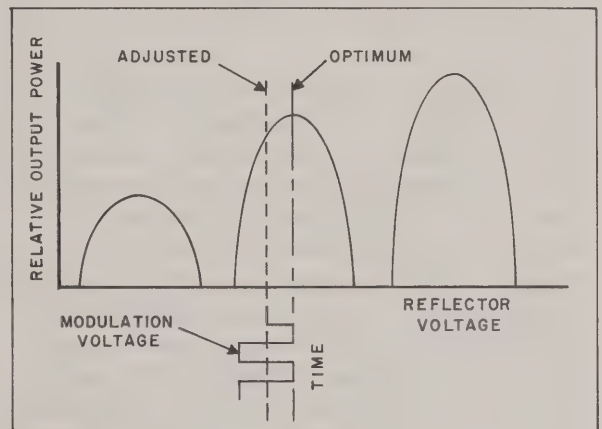
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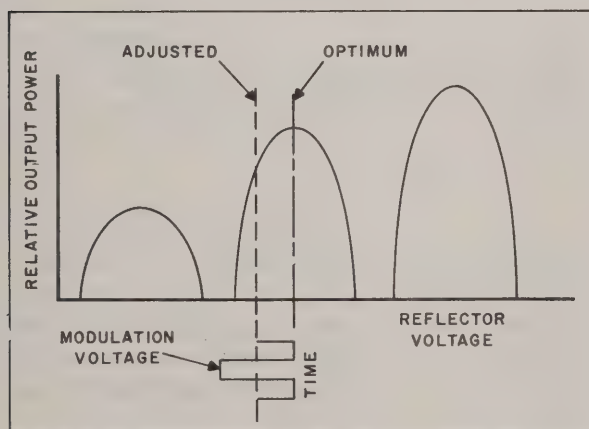
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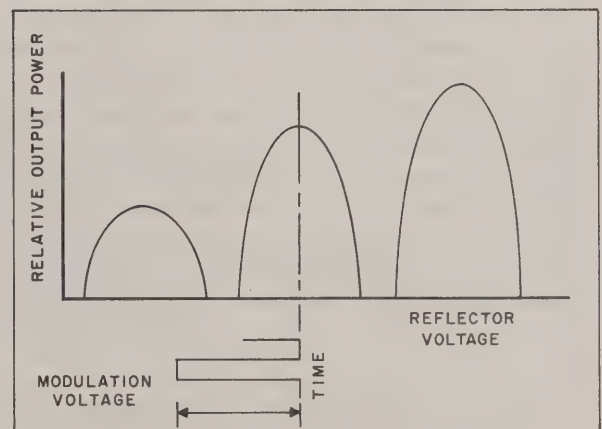
C



D



E



F

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Figure 6. Typical klystron wave shapes.

(dc) potential exists at this jack when the MODULATION switch is in the EXT. position. Use a capacitor with a voltage rating of 1,000 volts dc to isolate the external modulating equipment.

- (3) When the MODULATION switch is in the 1000 \sim or 60 \sim position, a high ac potential superimposed on a dc potential is present at the jack. These signals can be used as a synchronizing voltage. Measure the voltage and use a suitable volt-

age divider, and a dc blocking capacitor in series with the synch lead.

17. Stopping Procedure

a. To place the power supply in a stand-by position, set either the MODULATION or the REFL. RANGE switch to OFF.

b. To shut down the equipment completely, place the power switch to the down position (off), and remove the ac power cable from the power source.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S MAINTENANCE

18. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of Power Supply PP-3690/GPM are listed below, together with a reference to the paragraphs covering the specific maintenance functions. The duties assigned do not require tools or test equipment other than those issued with the power supply.

- a. Daily maintenance service and inspection (para 22).
- b. Cleaning (para 23).
- c. Replacement of fuses (para 24).

19. Tools and Materials Required for Operator's Maintenance

The tools and materials required for operator's maintenance are as follows:

a. *Tools.* The only tools required are those normally available to the operator.

b. *Materials.*

- (1) Cleaning Compound (Federal stock No. 7930-395-9542).
- (2) Cleaning cloth.

20. Preventive Maintenance

Preventive maintenance is systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. *Systematic Care.* The procedures given in paragraphs 22 and 23 cover systematic care essential to proper upkeep of this equipment when it is used separately. When this equipment is used as part of a *set* or *system*, follow the procedures established in the *set* or *system* manual. If the equipment is operated separately, the

cleaning operations (para 23) should be performed once each day that the equipment is used and, in any case, not less than once each week. All items of the weekly maintenance service and inspection chart should be checked before the equipment is placed in operation after an extended shutdown.

b. *Maintenance Service and Inspections.* The maintenance service and inspection instructions (para 22 and 23) outline inspections to be made at specific intervals; however, if the equipment is used as part of a *set* or *system*, follow the procedures established in the *set* or *system* manual. For equipment operated separately, these inspections are made to determine combat serviceability; that is, to determine that the equipment is in good general (physical) condition, in good operating condition, and likely to remain combat serviceable. To assist operators in determining and maintaining combat serviceability, the chart in paragraph 22 indicates what to inspect, how to inspect, and what the normal conditions are. The reference column lists the paragraph that contains additional information. If the defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of these inspections must be made in accordance with TM 38-750.

21. Maintenance Service and Inspection Periods

Maintenance service and inspections of the power supply are required on a daily basis. Paragraph 22 specifies service and inspections that must be performed daily, or prior to operating the power supply.

22. Daily Maintenance and Inspection Chart

Item No.	Procedure		Action or reference
	Item	Normal condition or result	
1	SET: Inspect equipment for cleanliness and lack of moisture.	Equipment is free from dirt and moisture. If not, clean dirt and moisture from exposed surfaces of case, control panel, cables, meter windows, etc.	Para 23.
5	COMPONENTS: Inspect for looseness of items. Inspect for binding and scraping in controls.	All switches, knobs, jacks, connectors, and pilot lamps are firmly seated. There is no binding or scraping in controls.	Tighten all loose items. Adjust controls to eliminate binding and scraping. If looseness, binding, or scraping is not eliminated, return power supply for higher echelon maintenance.
6	CABLES: Inspect cables for indications of future failure.	Cables must be free from breaks, cuts, kinks, deterioration, strain, and fraying.	Fraying or damaged portion of cable should be covered first with rubber tape and then with friction tape. Cables may require replacing.
Warning: Perform the following procedures exactly as directed. Dangerous voltages exist in the equipment.			
8	PREOPERATIONAL PROCEDURES: With output cable removed from OUTPUT connector on power supply front panel, connect red lead to klystron beam voltage terminal, brown and white leads to filament terminals, black lead to anode terminal, and shielded lead to reflector terminal.	All wires must be connected properly.	Para 14.
9	OPERATIONAL PRESET: Set controls as follows: MODULATION switch: OFF REFL. RANGE switch: OFF Power switch: Down (off) Connect ac power cable to source of 115-volt power at 50-60 cps.	All controls must set properly.	Para 14.
10	START: Set REFL. RANGE switch to OFF, power switch to ON, and MODULATION switch to CW.	LINE indicator lamp goes on.	Para 24. Higher echelon repair is required.
11	APPLICATION OF POWER: Set REFL. RANGE switch to 0-300.	BEAM indicator lamp goes on.	Higher echelon repair is required.
Caution: Always apply reflector voltage to a klystron tube before applying beam voltage.			
	Set REFL. RANGE switch and REFL. VOLTS control as required for type of klystron used. Set BEAM VOLTS control as required.	BEAM CURRENT meter indicates operating current.	Higher echelon repair is required.
12	PRELIMINARY 1000-CYCLE MODULATION PROCEDURES: With klystron tube output connected to suitable power indicator, rotate MOD. VOLTAGE control fully counterclockwise. Adjust BEAM VOLTS control until BEAM CURRENT meter indicates proper cathode current for klystron tube used. Adjust REFL. VOLTS control until power indicator indicates maximum cw output in chosen mode.	Normal klystron output wave shape (A, fig. 6) as indicated on power indicator.	Higher echelon repair is required.
13	OBTAIN 1000-CYCLE MODULATION: Set MODULATION switch to OFF and replace power indicator with suitable detector-tuned	Normal klystron output wave shape (B or C, fig. 6).	Higher echelon repair is required.

Item No.	Procedure		Action or reference
	Item	Normal condition or result	
	amplifier-indicator combination. Set MODULATION switch to 1000 ω . Adjust MOD. FREQ. control for maximum indication on indicator. Rotate REFL. VOLTS control slightly counterclockwise and adjust MOD. VOLTAGE control for normal modulated output indication.		
14	FINAL 1000-CYCLE MODULATION PROCEDURE: Set MODULATION switch to OFF and remove indicator. Connect original indicator, set the MODULATION switch to 1000 ω , and adjust REFL. VOLTS control for maximum klystron output. Rotate REFL. VOLTS control slightly counterclockwise and adjust MOD. VOLTAGE control for maximum modulated output indication. Rotate MOD. VOLTAGE control slightly clockwise and adjust REFL. VOLTS control for maximum indication.	Normal klystron output wave shape (E, fig. 6). (Avoid symptom shown in F, fig. 6.)	Higher echelon repair is required.
19	STOP: Set power switch to lower (off) position.	LINE and BEAM indicator lamps go off.	Higher echelon repair is required.

23. Cleaning

Inspect the exterior of the power supply. The exterior surfaces should be clean, and free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean soft cloth.

Warning: Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. *Do not* use near a flame.

b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with cleaning compound.

c. Use a brush to remove dust or dirt from the plugs and jacks.

Caution: Do not press on the meter face

when cleaning; the meter may become damaged.

d. Clean the front panel, the meter, and the control knobs; use a soft clean cloth. If it is difficult to remove dirt, dampen the cloth with water; mild soap may be used to make the cleaning more effective.

24. Replacement of Defective Fuses

The power supply has two fuses mounted on the front panel. To remove either fuse, turn the knob marked FUSE counterclockwise, and remove the fuse cap and fuse. Replace the defective fuse with an identical one (1 6-ampere, 250-volt, Slo-Blo, type 3AG for line fuse, and 1/4-ampere, 250-volt, Slo-Blo, type 3AG for beam power fuse) and replace the fuse and cap.

Section II. ORGANIZATIONAL MAINTENANCE

25. Scope of Unit Repairman's Maintenance

This section contains instructions covering second echelon maintenance of the power supply. It includes instructions for performing preventive and periodic main-

tenance services and repair functions to be accomplished by the organizational repairman. Organizational maintenance consists of the following:

a. Preventive maintenance (para 27).

- b. Troubleshooting (para 32).
- c. Replacement of defective fuses (para 24).

26. Tools, Materials, and Test Equipment Required

A list of parts authorized for second echelon maintenance is contained in appendix III. The tools and materials required for second echelon maintenance are the same as for first echelon maintenance and are given in paragraph 19.

27. Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all echelons concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance service and inspections of Power Supply PP-3690/GPM at the second echelon level are made at quarterly inter-

vals unless otherwise directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750. Paragraph 2 contains additional information concerning submission of specific forms.

28. Quarterly Maintenance

Quarterly maintenance on Power Supply PP-3690/GPM will be scheduled in accordance with the requirements in TM 38-750. All deficiencies or shortcomings will be recorded, and those not corrected during the inspection and service will be immediately reported to higher echelon by use of forms and procedures specified by TM 38-750. Equipment that has a deficiency that cannot be corrected by second echelon should be deadlined in accordance with TM 38-750. Perform all the services listed in the quarterly maintenance and inspection chart (para 29), in the sequence listed. Whenever a *normal condition or result* is not observed, take corrective action in accordance with the paragraph listed in the *Action or reference* column.

29. Quarterly Maintenance Service and Inspection Chart

Item No.	Procedure		Action or reference
	Item	Normal condition or result	
1	SET: Inspect the equipment for: a. Completeness. b. Cleanliness. c. Preservation.	a. Equipment must be complete (appx III). b. Units must be clean inside and out, and free of grease, dirt, rust, corrosion, and fungus. c. Painted surfaces must be free of bare spots, rust, and corrosion, and fungus.	a. Appx III. b. Para 23. c. Para 31.
2	PUBLICATIONS: See that pertinent publications are available (appx III).	a. Manual must be complete and in usable condition, without missing pages. b. All changes pertinent to equipment are on hand (DA Pamphlet 310-4).	a. Appx III. b. DA Pamphlet 310-4 for requirements.
3	MODIFICATION WORK ORDERS: Check DA Pamphlet 310-4 to determine if new applicable MWO MWO's have been published.	All urgent MWO's have been applied to the equipment. All ROUTINE MWO's have been scheduled.	Para 2
4	SET: Inspect the equipment for moisture.	Equipment must be free from moisture internally.	None.
5	PLUCK OUT ITEMS: Inspect internal components for looseness of connections.	All pluck out items must be firmly seated.	Replace items so they are firmly seated.

Item No.	Procedure		Action or reference
	Item	Normal condition or result	
6	COMPONENTS: Inspect internal components for indications of failure in the near future.	No charred resistors or bulging capacitors.	Higher echelon repair is required.
7	SPARE PARTS: Check all spare parts (operator and organizational) for general condition and method of storage.	All spare parts must be in good condition and properly stored. There should be no evidence of overstock, and all shortages will be on valid requisitions.	Appx III.
Warning: Perform the following procedures exactly as directed. Dangerous voltages exist in the equipment.			
8	PREOPERATIONAL PROCEDURES: With the output cables removed from the OUTPUT connector on the power supply front panel, connect the red lead to the klystron beam voltage terminal, the brown and white leads to the filament terminals, the black lead to the anode terminal, and the shielded lead to the reflector terminal.	All wires must be connected	Para 14.
9	OPERATIONAL PRESET: Set the controls as follows: MODULATION switch: OFF. REFL. RANGE switch: OFF. Power switch: Down (off). Connect the ac power cable to a source of 115-volt power at 50-60 cps.	All controls must set properly.	Para 14.
10	START: Set the REFL. RANGE switch to OFF, the power switch to ON, and the MODULATION switch to CW.	LINE indicator lamp lights.	Para 32b.
11	APPLICATION OF POWER: Set the REFL. RANGE switch to 0-300.	BEAM indicator lamp lights.	Para 32b.
Caution: Always apply reflector voltage to a klystron tube before applying beam voltage.			
	Set the REFL. RANGE switch and REFL. VOLTS control as required for the type klystron used. Set the BEAM VOLTS control as required.	BEAM CURRENT meter indicates the operating current.	Higher echelon repair is required.
12	PRELIMINARY 1,000-CYCLE MODULATION PROCEDURES: With the klystron tube output connected to a suitable power indicator, rotate the MOD. VOLTAGE control fully counterclockwise. Adjust the BEAM VOLTS control until the BEAM CURRENT meter indicates the proper cathode current for the klystron tube used. Adjust the REFL. VOLTS control until the power indicator indicates the maximum cw output in the chosen mode.	Normal klystron output wave shape (A, fig. 6) as indicated on the power meter.	Higher echelon repair is required.
13	OBTAIN 1,000-CYCLE MODULATION: Set the MODULATION switch to OFF and replace the power indicator with a suitable detector-tuned amplifier-indicator combination. Set the MODULATION switch to 1000 ω . Adjust the MOD. FREQ. control for the maximum indication on the indicator. Rotate the REFL. VOLTS	Normal klystron output wave shape (B or C, fig. 6).	Higher echelon repair is required.

Item No.	Procedure		Action or reference
	Item	Normal condition or result	
	control slightly counterclockwise and adjust the MOD. VOLTAGE control for the normal modulated output indication.		
14	FINAL 1,000-CYCLE MODULATION PROCEDURE: Set the MODULATION switch to OFF and remove the indicator. Connect the original indicator, set the MODULATION switch to 1000~, and adjust the REFL. VOLTS control for the maximum klystron output. Rotate the REFL. VOLTS control slightly counterclockwise and adjust the MOD. VOLTAGE control for the maximum modulated output indication. Rotate the MOD. VOLTAGE control slightly clockwise and adjust the REFL. VOLTS control for the maximum indication.	Normal klystron output wave shape (E, fig. 6). (Avoid symptom in F, fig. 6.)	Higher echelon repair required.
15	PRELIMINARY 60-CYCLE MODULATION PROCEDURES: With the klystron tube output connected to a suitable oscilloscope by means of a crystal diode, set the frequency of the horizontal input to the oscilloscope to 60 cps. Perform the procedures described in steps 8 through 12 above with the oscilloscope.	As specified.	Higher echelon repair is required.
16	OBTAIN 60-CYCLE MODULATION: Set the MODULATION switch to 60~. Adjust the 60~ PHASE control until the two oscilloscope indications are superimposed. Adjust the MOD. VOLTAGE control for the desired amplitude.	Normal klystron output.	Higher echelon repair is required.
17	PRELIMINARY EXTERNAL MODULATION PROCEDURES: The preliminary external modulation procedures are the same as for 60-cycle modulation. Refer to step 15 above.	As specified.	Higher echelon repair is required.
Warning: Perform the following procedure exactly as specified. Dangerous voltages are present.			
18	USING EXTERNAL MODULATION: Set the MODULATION switch to OFF. Connect the external modulating source by means of the front-panel EXT. MOD. jack. Set the MODULATION switch to EXT.	Normal klystron output.	Higher echelon repair is required.
19	STOP: Place the power switch down (off).	LINE and BEAM indicator lamps go off.	Higher echelon repair is required.

30. Lubrication

Power Supply PP-3690/GPM requires no lubrication.

31. Painting Instructions

Clean rust and corrosion from metal

surfaces by lightly sanding the surfaces with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TM 9-2851.

32. Troubleshooting

a. Troubleshooting of this equipment is based on the operational check contained in the quarterly operational service and inspection chart (para 29). To troubleshoot the equipment, perform all functions listed in the chart, starting with item No. 10, and proceed through the items until an abnormal condition or result is observed,

in which case note the item number and turn to the corresponding number in the troubleshooting chart (b below). Perform the checks and corrective actions indicated in the troubleshooting chart. If the corrective measures indicated do not result in correction of the trouble, higher echelon maintenance is required.

b. Troubleshooting Chart.

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
10	LINE indicator lamp does not light.	a. Incorrect settings of switches and controls. b. Improperly connected cables. c. Defective fuse.	a. Make correct settings of switches and controls. b. Connect cables properly. c. Replace fuse (para 24).
11	BEAM indicator lamp does not light.	Defective fuse.	Replace fuse (para 24).
12	Abnormal indication.	a. Defective klystron or power indicator. b. Defective component in power supply.	a. Replace klystron or power indicator. b. Higher echelon repair is required.
13	Abnormal indication.	a. Defective power indicator. b. Defective component in the power supply.	a. Replace power indicator. b. Higher echelon repair is required.
14	Abnormal indication as described.	Incorrect setting of switches and controls.	Make correct setting of switches and controls.

CHAPTER 4

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

33. Disassembly of Equipment

Disassembly of the power supply consists of removing the cable from the front-panel output connector.

34. Repackaging for Shipment or Limited Storage

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored. Adapt the procedure outlined below whenever circumstances permit. The information concerning the original packaging (para 8) will be helpful.

a. Materials Required. The following materials are required for packaging the power supply. For stock numbers of materials, consult SB 38-100.

Material	Quantity
Filler material -----	4 lb
Corrugated cardboard--	32 sq ft
Gummed tape -----	17 ft
Gummed waterproof tape	20 ft
Waterproof paper -----	16 sq ft

b. Packaging. Package the power supply as follows:

- (1) Cushion the power supply on all surfaces with pads of filler material.
- (2) Place the cushioned unit within a wrap of corrugated cardboard.
- (3) Secure the wrap with gummed tape.
- (4) Protect the corrugated cardboard wrap with a waterproof paper barrier.
- (5) Seal the seams of the paper barrier with waterproof tape.
- (6) Place the technical manuals within a waterproof paper barrier and seal the seams of the barrier.
- (7) Place the spare parts within the wrap of corrugated cardboard.
- (8) Secure the wrap with gummed tape.

c. Packing.

- (1) Place the three packages in the wooden box.
- (2) Nail a wooden lid on the box.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

35. Authority for Demolition

The demolition procedures given in paragraph 36 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

36. Methods of Destruction

Any or all of the methods of destruction given below may be used. The time available will be the major determining factor for the methods to be used in most instances when destruction of equipment

is undertaken. The tactical situation also will determine how the destruction order will be carried out. In most cases, it is preferable to demolish completely some portions of the equipment rather than partially destroy all the equipment parts.

a. Smash. Smash the power supply; use sledges, axes, hammers, crowbars, and any other heavy tools available.

b. Cut. Cut cabling and power cable; use axes, handaxes, machetes, and similar tools. Cut cables in a number of places.

Warning: Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.

c. *Burn*. Burn as much of the equipment as is flammable; use gasoline, oil, flame-throwers, and similar tools. Burn the instruction literature first. Use a flame-thrower to burn spare parts, or pour gasoline on the spares and ignite them. Use incendiary grenades to complete the destruction of the unit.

d. *Explode*. Use explosives to complete demolition or to cause maximum damage, before burning, when time does not permit

complete demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used. Incendiary grenades usually are most effective if destruction of small parts and wiring is desired.

e. *Dispose*. Bury or scatter destroyed parts, or throw them into nearby waterways. This is particularly important if a number of parts have not been completely destroyed.

APPENDIX I

REFERENCES

Following is a list of applicable references available to the operator and unit repairman of Power Supply PP-3690/GPM.

DA Pamphlet 310-4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
MIL-STD-129B	Marking for Shipment and Storage.
SB 38-100	Preservation, Packaging, and Packaging Materials, Supplies, and Equipment Used by the Army.
TM 9-2851	Painting Instructions for Field Use.
TM 38-750	The Army Equipment Record System and Procedures.

APPENDIX II

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

I. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are as follows:

- (1) *Part or component*. This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and the subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) is listed in disassembly order or alphabetical order.

- (2) *Maintenance function*. This column indicates the various maintenance functions allocated to the echelons.

- (a) *Service*. To clean, to preserve, and to replenish lubricants.
- (b) *Adjust*. To regulate periodically to prevent malfunction.
- (c) *Inspect*. To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.
- (d) *Test*. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.
- (e) *Replace*. To substitute serviceable components, assemblies, or subassemblies, for unservice-

able components, assemblies, or subassemblies.

- (f) *Repair*. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

- (g) *Align*. To adjust two or more components of an electrical system so that their functions are properly synchronized.

- (h) *Calibrate*. To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

- (i) *Overhaul*. To restore an item to *completely serviceable* condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

- (j) *Rebuild*. To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all

parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

- (3) *1st, 2d, 3d, 4th, 5th echelons.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.
- (4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

- (5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

- (1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.
- (2) *1st, 2d, 3d, 4th, 5th echelon.* The dagger (†) indicates the echelons normally allocated the facility.
- (3) *Tool code.* This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

PART OR COMPONENT	MAINTENANCE FUNCTION	ECHOLON					TOOLS REQUIRED	REMARKS
		1	2	3	4	5		
POWER SUPPLY PP-3690/GPM	service	X						Exterior Panel Control Settings Exterior and Interior Operational Tests
	adjust	X						
	inspect	X					1,2,3,4,5,7,8,9	
	test	X						
	repair	X						
POWER SUPPLY PP-3680/GPM	align						1,2,3,4,5,7,8,9,10	Exterior Panel Control Settings Exterior and Interior Operational Tests
	overhaul						1,2,3,4,5,7,8,9	
	service	X						
	adjust	X						
	inspect	X					1,2,3,4,5,7,8,9	
CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CY-8660/U	test	X						Exterior Panel Control Settings Exterior and Interior Operational Tests
	repair	X						
	align	X					1,2,3,4,5,7,8,9,10	
	overhaul	X					1,2,3,4,5,7,8,9	
	repair	X					1,2,3,4,5,6,7,8,9,10	
							6	

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS		ECHELON					TOOL CODE	REMARKS
		1	2	3	4	5		
DC VTVM, HEWLETT PACKARD MODEL 413A							1	No equivalent military equipment
MULTIMETER TS-352/U							2	
OSCILLOSCOPE AN/USM-81							3	
RESISTOR, WIRE WOUND RW33V802							4	Dummy load
TOOL KIT TK-87/U							5	
TOOL KIT TK-88/U							6	
TRANSFORMER CN-16/U							7	
VOLTMETER, ELECTRONIC AN/USM-93							8	
VOLTMETER METER ME-30/U							9	
TUBE TESTER TW-2/U							10	
PLUS SHOP SUPPORT								

APPENDIX III

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This appendix lists items supplied for initial operation and for running spares. The list includes tools, parts, and material issued as *part of* the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

a. Source, Maintenance, and Recoverability Code. Not used.

b. Federal Stock Number. This column lists the 11-digit Federal stock number.

c. Designation by model. Not used.

d. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

e. Unit of Issue. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

f. Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.

g. Quantity Authorized. Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment.

h. Illustrations. Not used.

Section II. FUNCTIONAL PARTS LIST

FIRST ECHELON REPAIR PARTS AND SPECIAL TOOLS LIST

(1)	(2)	(3)	(4)	(5)	(6) (7)	
Federal stock No.	Description	Unit of issue	Expendability	Quantity Authorized	Illustrations	
					Figure NR	Item NR
6625-889-1198	POWER SUPPLY PP-3690/GPM: electronic type half-wave rectification; electronic type full-wave rectification; output data dc, -1300v max 10 ua, -400v max 50 ma; 6.3v ac, 1.5 amp; oper power requirement 115v ac, 50-60 cps single ph; alternate oper power requirement 230v ac 50-60 cps single ph; 14 in lg x 7-1/2 in. w x 11-1/2 in. h o/a; General Microwave Corp model No. 303.					
Ord thru AGC	ITEMS COMPRISING AN OPERABLE EQUIPMENT TECHNICAL MANUAL TM 11-6625-544-12			2		
6625-889-1197	POWER SUPPLY PP-3690/GPM: (BASIC COMPONENT) CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-8660/GPM: for use w/klystron tube; 5 cond; 1 Cannon Electric Co. connector one end; conds on 2nd end are wire tinned; approx 3-1/2 ft lg; General Microwave Corp part No. 2115.		NX NX	1 1		
	RUNNING SPARE ITEMS NO PARTS AUTHORIZED FOR STOCKAGE AT FIRST ECHELON.					

By Order of Secretary of the Army:

EARLE G. WHEELER,
*General, United States Army,
Chief of Staff.*

Official:

J. C. LAMBERT,
*Major General, United States Army,
The Adjutant General.*

Distribution:

Active Army:

DASA (6)
USASA (2)
CNGB (1)
CofEngrs (1)
TSG (1)
CSigO (5)
CofT (1)
USA CD Agcy (1)
USAATBD (1)
USCONARC (5)
Hq, Army Mat Comd (5)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOGCOMD (2)
USA Elct Comd (5)
USA Msl Comd (4)
USA Strat Comm Comd (4)
MDW (1)
Armies (2)
Corps (2)
USA Corps (3)
USATC AD (2)
USATC Engr (2)
USATC Inf (2)
USATC FA (2)
USATC Armor (2)
Instl (2) except
 Ft Monmouth (63)
Svc Colleges (2)
Br Svc Sch (2)
GENDEP (OS) (2)
Army Dep (2) except
 Sacramento (17)
 Lexington (12)
 Tobyhanna (12)

Ft Worth (8)
Sig Sec, GENDEP (5)
Sig Dep (OS) (12)
USA Elct R&D Actv,
 White Sands (13)
USA Elct R&D Avtv,
 Ft Huachuca (2)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
AMS (1)
Army Pic Cen (2)
USA Mob Spt Cen (1)
USA Elct Mat Agcy (25)
Chicago Procurement Dist (1)
USARCIB Sig Agcy (1)
Sig Fld Maint Shops (3)
WRAMC (1)
AFIP (1)
JBUSMC (2)
Units org under fol
 TOE (2 cy ea UNOINDC)
 11-7
 11-16
 11-57
 11-97
 11-117
 11-155
 11-157
 11-500(Tms AA-AE) (4)
 11-557
 11-587
 11-592
 11-597

NG: State AG (3).

USAR: None.

For explanation of abbreviations used see AR 320-50.

TM 11-6625-544-12 POWER SUPPLY PP-3690/GPM-1962